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Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 03-F-062PCT	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/JP2003/011385	International filing date (day/month/year) 05 September 2003 (05.09.2003)	Priority date (day/month/year) 05 September 2002 (05.09.2002)
International Patent Classification (IPC) or national classification and IPC G01N 5/02, C09D 183/00, C09D 5/00		
Applicant TOKYO UNIVERSITY OF PHARMACY AND LIFE SCIENCE		

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
  - ☒ (sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:
    - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
    - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
  - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) \_\_\_\_\_, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

- This report contains indications relating to the following items:
  - ☒ Box No. I Basis of the report
  - ☐ Box No. II Priority
  - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - ☐ Box No. IV Lack of unity of invention
  - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - ☐ Box No. VI Certain documents cited
  - ☐ Box No. VII Certain defects in the international application
  - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand 09 April 2004 (09.04.2004)	Date of completion of this report 08 December 2004 (08.12.2004)
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2003/011385

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_, which is language of a translation furnished for the purpose of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

- ☐ The international application as originally filed/furnished
- ☒ the description:
- pages \_\_\_\_\_ 1, 4-13 \_\_\_\_\_, as originally filed/furnished
- pages\* \_\_\_\_\_ 2, 3 \_\_\_\_\_ received by this Authority on 27 September 2004 (27.09.2004)
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

- ☒ the claims:
- pages \_\_\_\_\_
- pages\* \_\_\_\_\_, as originally filed/furnished
- pages\* \_\_\_\_\_ 8-11 \_\_\_\_\_, as amended (together with any statement) under Article 19
- pages\* \_\_\_\_\_ received by this Authority on 27 September 2004 (27.09.2004)
- \_\_\_\_\_ received by this Authority on \_\_\_\_\_

- ☒ the drawings:
- pages \_\_\_\_\_
- pages\* \_\_\_\_\_ 1-12 \_\_\_\_\_, as originally filed/furnished
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- \_\_\_\_\_ received by this Authority on \_\_\_\_\_

- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☒ the claims, Nos. \_\_\_\_\_ 1-7 \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (specify): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (specify): \_\_\_\_\_

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (specify): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (specify): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	8-11	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	8-11	NO
Industrial applicability (IA)	Claims	8-11	YES
	Claims		NO

**2. Citations and explanations**

Claims 8-11

Document 1: KAMISHO, TANAMURA, UCHIDA and TERAMAE,  
"Kaimen Kasseizai-Silica Nano Kouzoutai wo  
Riyou shita Ion Ninshiki," The Japan Society  
for Analytical Chemistry Dai 50 Nenkai Kouen  
Youshishuu, 09 November 2001, p. 208

Document 2: TANAMURA, KAMISHO, YAMASHITA, UCHIDA and  
TERAMAE, "Kagaku Shuushoku-gata Nano  
Saikoutai Sousei to Keikou Probe wo Mochiita  
Saikou-nai Kankyou Hyouka," The Japan  
Society for Analytical Chemistry Dai 49  
Nenkai Kouen Youshishuu, 12 September 2000,  
p. 122

Document 3: IYOSHI, KUROSAWA et al., "MPS Maku wo Hifuku  
shita QCM no Shitsudo Sensor toshite no  
Oyou," The Surface Finishing Society of  
Japan, Dai 104 Kai Kouen Taikai Kouen  
Youshishuu, 07 September 2001, pp. 15-16.

Document 4: WO 01/81487 A1 (Science & Technology Corp. @  
UNM) 01 November 2001, & CA 2404013 A & AU  
5712101 A & US 2002-46682 A1 & EP 1276824 A  
& US 2003-39744 A1 & JP 2003-531269 A

Document 5: Hongyou FAN et al., Nature, Vol. 405, 04 May

2000, pp. 56-60

Document 1 presents an analysis device configured by immobilizing a thin film, which comprises rod-shaped surfactant micelles within silicon nanopores, upon a substrate, wherein said rod-shaped surfactant micelles form a hydrophobic environment and thereby make it possible to recognize molecules and/or ions.

Document 2 presents silica nanopores with alkyl chains created by subjecting the MCM-41 precursor, which is a silica-surfactant complex, to the action of a silane coupling agent, wherein the hydrophobicity of the interior of the nanopores increases as the lengths of the alkyl chains increase and thereby make it possible to recognize molecules and/or ions in water.

Document 3 presents a humidity/gas sensor configured by coating a thin film of a mesoporous silica, which is created using a surfactant as a template, upon a quartz crystal microbalance (QCM) quartz oscillator. In addition, document 3 indicates that the frequency change of the QCM coated with a mesoporous silica film prior to the removal of the surfactant is greater than that of the QCM prior to coating.

Therein, the inventions that are indicated in documents 1-3 pertain to sensors wherein a thin film comprising nanochannels is used in the recognition of molecules and/or ions; therefore, it would be easy for a person skilled in the art to conceive of using the thin films comprising nanochannels that are indicated in documents 1 and 2, wherein the oxide layer contains surfactant micelles, in the crystal oscillator nanochannel sensor formed from a thin film comprising nanochannels that is disclosed in document 3.

In addition, methods for producing thin films that comprise nanochannels are disclosed in document 4 and

document 5.

Document 4 discloses a method for producing coating films, wherein the composition of the film solution includes TEOS (tetraethylorthosilicate), MPS (mercaptopropyltrimethoxysilane), HCl, water, CATB (cetyltrimethylammonium bromide) and ethanol (the same is true of document 5).

Therefore, documents 4 and 5 disclose technology that is similar to the methods for producing thin films comprising nanochannels that are set forth in claims 8-11 and in the examples of the present application.

Consequently, it would be easy for a person skilled in the art to conceive of the inventions that are set forth in claims 8-11 by applying the methods for producing thin films that are disclosed in documents 4-5 in the production of the crystal oscillator nanochannel sensors that are presented in documents 1-3.